DOCUMENT RESUME

ED 273 582 SP 027 882

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TITLE Conceptual Level and the Hearing-Impaired Preservice Teacher.
PUB DATE Aug 86
NOTE 25p.
PUB TYPE Reports - Research/Technical (143)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Abstract Reasoning; *Cognitive Processes; *Cognitive Style; *Hearing Impairments; Higher Education; *Preservice Teacher Education; *Student Teachers; Teacher Behavior
IDENTIFIERS *Conceptual Level

ABSTRACT

A pilot study investigated the conceptual level of hearing-impaired preservice teachers as they experienced practicum work with hearing pupils. Eight hearing-impaired student teachers from the Gallaudet College undergraduate teacher education program were videotaped on two different occasions as they taught hearing pupils in public schools during a full-time practicum. Within 24 hours of the videotaping, a stiumulated-recall method was used to elicit student teachers' reasons for following certain classroom procedures. Categorized responses were then analyzed according to conceptual level (Grimmett, 1984). Results indicated: (1) a clear growth in abstract reasoning from subjects' pre-student teaching period (Spring 1984) to the time following their completion of this hearing-world practicum (Spring 1985); (2) 54%% of the responses to interview questions on the first videotape were at a high (Level IV) conceptual level; (3) no real change in the percentage of high conceptual level responses to interview questions was found between the first and second videotaping; and (4) degree of hearing loss appears to have no relationship to the conceptual level of hearing-impaired student teachers' responses to interview questions about the reasoning behind their classroom actions. A five-page bibliography concludes the document. (Author/AA)

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CONCEPTUAL LEVEL AND THE HEARING-IMPAIRED PRESERVICE TEACHER

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August 1986

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Conceptual Level and the Hearing-Impaired Teacher

Abstract

A pilot study investigated the conceptual level of hearing-impaired preservice teachers as they experienced practicum work with hearing pupils. Eight hearing-impaired student teachers from the Gallaudet College undergraduate teacher education program were videotaped on two different occasions as they taught hearing pupils in public schools during a full-time practicum. Within 24 hours of the videotaping, a stimulated-recall method was used to elicit student teachers' reasons for following certain classroom procedures. Categorized responses were then analyzed according to conceptual level (Grimmett, 1984). Results indicated: (1) a clear growth in abstract reasoning from subjects' pre-student teaching period (Spring 1984) to the time following their completion of this hearing-world practicum (Spring 1985); (2) 54% of the responses to interview questions on the first videotape were at a high (Level IV) conceptual level; (3) no real change in the percentage of high conceptual level responses to interview questions was found between the first and second videotaping; and (4) degree of hearing loss appears to have no relationship to the conceptual level of hearing-impaired student teachers' responses to interview questions about the reasoning behind their classroom actions.

Introduction

In educating the deaf child, the hearing teacher responds to special demands that are not required with other children. The differences between the teacher's "native" communication and cultural system and that of the deaf learner present cognitive challenges to that teacher. However, the teacher who is also deaf sometimes has an initial communication advantage in dealing with the deaf learner, due to familiarity with both the language and the subculture of deaf persons. The cognitive demands placed on the deaf person in that environment are therefore probably different than those placed on the hearing teacher working with the deaf child. But the deaf teacher who is working with a hearing learners faces a unique set of cognitive (and affective) demands that are occasioned by dissonances similar to those which the hearing teacher faces in working with the deaf learner.

Gallaudet College has a unique program to prepare deaf college students for certification as teachers of hearing children; this certification is a prerequisite for their later graduate work in education of the deaf--these students' ultimate professional goal. However, in meeting the requirements of the initial certification for "regular" education, these young deaf adults must complete not only relevant course work but also a full-time student teaching practicum experience in public schools with normal hearing children. No research to date has systematically investigated the nature of the cognitive demands posed by this situation, nor the coping and survival mechanisms which successful graduates of this program must develop. The present pilot study investigated this situation from a cognitive point of view.

Related Research

Considerable research in recent years has investigated the mental processes used by non-handicapped teachers in the process of the daily tasks of instruction with non-handicapped clientele. A helpful summary of studies on teacher thinking was compiled by Clark and Yinger (1979). Additional work has been done by: Taylor (1970) in analyzing teachers' ability to plan systematically; Johnson (1972) in the cognitive analysis of teacher judgment; Mondol (1973) on alternative teaching strategies in problem-solving; Marland (1982) in developing three models of teacher thinking; and Duff (1977) on the relationship between a teacher's theory and his/her behavior. Works by Gage (1978) and Shulman and Elstein (1975) have called for studying the mental processes of teachers at work.

The importance of teachers' higher-level cognitive behaviors was underscored by Herrick (1962) in his work on teacher preparation and by Gil (1980) and Carbone (1980) in their research on teacher strategies for gathering information and carrying out pupil diagnosis.

Murray (1983) found that the way a teacher organizes his/her thinking for non-teaching and for teaching are independent and different, and that teachers' proposed strategies for teaching a concept indicate a higher level of reasoning than their own responses to explaining the same concept themselves.

Cognitive Factors in Teaching

What is meant by the cognitive factors involved in the behaviors of teaching? An operational definition has been presented by Costa (1982) using four stages of the teaching act--planning, interaction, analyzing and

evaluating, and applying. Within the Planning stage, specific cognitive behaviors include selecting alternative strategies, overcoming the teacher's own egocentrism, classification, and task analysis. In the Interactive stage, cognitive behaviors include use of strategies, interpreting cues, and making temporal decisions. In the Analyzing and Evaluating stage, the teacher must carry out such behaviors as comparison, and distinguishing cause from effect. Finally, in the Applying stage, teachers must "project" one classroom experience to the next, and carry out such cognitive behaviors as planning through hypothetical thinking and planning based upon principles using an analysis of previous lessons (Costa, 1982).

Clark and Peterson (in press, pp. 9-10), however, divide teachers' thinking into just two categories: planning and interactive decisions. The kind of thinking that teachers do during interactive teaching does appear to be qualitatively different from the kind of thinking they do when they are not interacting with students.

Although teachers report frequent "decisions" about classroom behaviors, major changes appear to be infrequent. Analysis of teachers' thinking while teaching, which is usually elicited by stimulated recall through viewing a videotape, indicates that "teachers make one interactive decision every two minutes" (Clark & Peterson, in press, p. 52).

Teacher planning may best be represented in a cyclical, rather than a linear model, in which teachers plan, teach, evaluate, and then plan for the next episode (Clark, 1985). The research focusing on teacher decision-making, identifies through the stimulated-recall method, that a teacher makes a decision on the average of once every two minutes; decisions relate to

students, procedures, objectives, materials, and content (Clark, 1985). A recent trend resulting from this research is the view of the teacher as a thinker; in prior years, teachers had been seen as primarily intuitive and nurturant, rather than logical (Lampert, 1985). It may also be that logical thinking is not always appropriate for teaching because of the interactive and contextual nature of teaching, and that the intuitive and nurturant characteristics may now be viewed as positive traits (Lampert, 1985).

Teachers' Thinking and Behavior

Theoretical models for relating teachers' thinking and behavior are developed in recent reviews of research. Clark and Peterson (in press, pp. 7-12) postulate a relationship between teachers' thinking (planning, interactive decisions, and beliefs) and teachers' actions and their observable effects (teachers' classroom behavior, students' classroom behavior, and student achievement); both are influenced by certain constraints and opportunities (physical setting, curriculum, etc.).

In regard to the cognitive basis for being a successful classroom manager, Kounin (1970) identified two skills: "withitness" which is the ability to know what children are doing in the classroom at any moment, and "overlap" which is the ability to pay attention to several ideas or actions at the same time. Buckner and McGrath (1963) have labeled the first of these characteristic skills "vigilance" in reference to teachers' ability to monitor ongoing events and to detect changes or deviations in classroom events. Other cognitive psychologists have examined the skill of what has been termed "split attention" in regard to the person's ability to attend to two or more sources simultaneously (Treisman, 1969; Greenwald, 1972; Neisser, 1976).

The research on this aspect of teaching appears now to have moved away from a focus on teacher characteristics and toward an analysis of the structural acts performed in teaching (Brooks & Shouse, 1984); this shift is fundamental and brings research and supervision closer to the realities of teaching. The work of Clark and Yinger (1977) and Shavelson (1977) indicate that teachers tend not to consider objectives first, but rather that they consider content and then materials as first priorities; Berliner (1983) in his work on the "executive functions of teaching" concludes that teachers are successful when they master these executive functions and the content, as opposed to the conceptual aspects of teaching, with the possible exception of the planning process. The Clark and Yinger findings were successfully replicated with middle school teachers (Neale & Sardo, 1984). However, the recent work of Pittman (1984) conflicts with that conclusion; in a study of teachers' classroom management strategies, she found that management objectives (though not initially verbalized to an experimenter) provide the rationale and starting point for teacher selection of activities.

Teachers' Conceptual Development

Another body of research has investigated the stages of teachers' conceptual development (Harvey, Hunt, & Schroeder, 1961; Loevinger, 1966; Perry, 1969; Hunt & Joyce, 1967; Murphy & Brown, 1970). Hunt (1975) defines conceptual level as a

> person characteristic, indexing both cognitive complexity (differentiation, discrimination, and integration) as well as interpersonal maturity (increasing self-responsibility). A person at a higher Conceptual Level is more structurally complex, more capable of responsible actions, and, most important, more capable of adapting to a changing environment than a person at a lower conceptual level.

Colker (1984) found that the size of the student group was unrelated to the level of teacher thinking. The concept of "conceptual level" is viewed by researchers on an abstract-concrete continuum. The concrete end of the continuum is unilateral dependence of thought (Level I), in which poorly integrated thought patterns depend on externally prescribed criteria and result in categorical judgments about causality; Level II (negative dependence) is characterized by strong avoidant tendencies toward externally prescribed criteria and by a self-perception of consistent failure; Level III (conditional dependence of thought) is characterized by the individual now seeing himself as a causal agent in attaining rewards, and perceiving himself in a mutual dependency relationship with others; and the highest level, Level IV (interdependence of thought), is characterized by an information orientation in which the person shows autonomous and interdependent thought patterns, and approaches problems in a varied and adaptive manner (Grimmett, 1984). In a study using this continuum, Grimmett (1984) found that when supervisors of teachers used more abstract thought processes, their supervisees tended to show a marked increase in conceptual functioning. In the pilot study which is the subject of this article, the supervisors were characterized as using a combination of both abstract and concrete verbal processes in their supervisory comments to the subjects of the study throughout the eight-week practicum period.

The significance of the cognitive life of teachers is succinctly summarized by Clark and Peterson (in press):

> The thinking, planning, and decision making of teachers constitute a large part of the psychological context of teaching. It is within this context that curriculum is interpreted and acted upon; where teachers teach and students learn. Teacher behavior is substantially influenced and even determined by teachers' thought processes.

> These are the fundamental assumptions behind the literature that has come to be called research on teacher thinking. (p. 1)

Stimulated-Recall as an Analytical Tool

The previously mentioned technique of "stimulated recall" has been a useful tool for analyzing teacher cognition in a research environment. This method involves the videorecording of teaching incidents by a supervisor, a replay of these incidents for the supervisee in the presence of the supervisor, and supervisor questioning of supervisees about the incidents as they both view the video replay. Based on the use of videotape playbacks in the presence of an experimenter and the teacher, this technique may also enable the supervisees to reflect on their mental processes at the times of key incidents when recalled in this manner. Morine-Dershimer (1984) found that teachers' cognitive complexity is indicated by their sequences of thought, while their beliefs are apparently indicated by their use of imagery such as metaphor; beliefs of teachers are important, since we may postulate that teacher behavior follows from teacher beliefs. Using the stimulated-recall technique, Galluzzo (1984) found that teachers tend not to think about teaching while they are interactively teaching but that when given the opportunity to recall the act through the videotaped stimulated- recall method, teachers respond with data that is categorizable under a variety of teacher "concerns." The highest frequency of those concerns relates to pupil-learning and pupil attitude, followed in descending order by concern with choice of activities, lesson content, scheduling, pacing, time limitations, and choice of materials.

The technique of stimulated-recall used in the present study was based on the assumption that subjects are able and willing to recall and articulate

their thought process as accurately and completely as possible (Tuckwell, 1980). The technique was originally developed by Bloom (1953) by presenting a subject with a large number of cues that occurred during some prior situation. This technique has been challenged in regard to the accuracy of the verbal reports that are occasioned by this method in the sense that when situations involve the subject's ego, subjects may give inaccurate reports which will best represent their social desirability and increase their self-esteem (Gaier, 1954; Wilson & Nisbett, 1978). Nonetheless, with these cautions acknowledged, the present study proceeded to use this technique as the most appropriate available for the purpose of investigating changes in the conceptual level of the hearing- impaired teacher who is working with hearing children. The decision to proceed with this technique was also based on Bloom's earlier finding (1953) that subjects within forty-eight hours could recall their overt activities with about 95% accuracy.

It is apparent, then, that teaching clearly has cognitive implications. The work of Halkes and Deykers (1984) concludes that teachers construct specific situational images which function as conditional frameworks for selection of activities and procedural decisions; teachers visualize the future and construct a framework to "guide future action" (Clarke, 1983).

The Deaf Teacher with Hearing Students

In examining the specific cognitive setting for the hearing-impaired teacher working with hearing children for the present study, we postulated that certain unique features characterize that environment. The deaf person who is taking on responsibilities in a hearing environment that are dependent on aural/oral communication encounters a dissonance because of at least two conditions:

1. Moving from the familiar to the unfamiliar

2. Becoming involved in a new linguistic context.

The present study investigated the conceptual level of hearing-impaired teacher trainees working with hearing children in terms of the cognitive consequences of this dissonance.

Design of the Study

The basic question which this pilot study addressed was, "What cognitive impact on the hearing-impaired preservice teacher results from working with hearing children in a hearing world environment?"

Subjects. Eight senior-year undergraduate student teachers from Gallaudet College, all majors in Education, constituted the sample for this pilot study. All had a moderate-to-profound hearing impairment, all were fluent in Signed English, and all had successfully completed prior course work in educational foundations and methods of teaching. All except one used the services of a sign language interpreter during their student teaching; seven of the eight were women. No control subjects were available for this pilot study.

Setting. All subjects were involved in an eight-week full-time student teaching practicum in regular public schools within commuting distance of the Washington, D.C. location of the College. In this setting, student teachers were required to carry out all the functions of teaching under the supervision of a Cooperating Teacher (the regular teacher of the classroom), and of a College Supervisor who made a structured observation at least once per week. Four of the student teachers were involved in a student teaching experience at the elementary school level, while the other four were involved in student teaching at the secondary school level.

Measures. All subjects were asked to take the Raven's Standard Progressive Matrices prior to student teaching and again at the end of the student teaching period. In addition, the technique of stimulated recall was used on two occasions using videotapes of the subject in action with pupils; oral responses were categorized according to conceptual level (Grimmett, 1984).

Procedure. On two occasions--once during the second week of the practicum experience, and again during the seventh week of the experience--each student teacher was videotaped for 30 minutes while teaching a lesson of their choice. Each of these videotapes was then viewed by the student teacher (within 24 hours) in the presence of an experimental assistant. The technique of stimulated-recall was used by the assistant during the viewing to elicit from student teachers their rationales for choosing particular activities at different critical-incident points during the lessons.

Subjects were asked to distinguish as far as possible between ideas occurring to them during the stimulated-recall sessions and those which occurred to them while they were actually teaching the episode shown on the videotape. Subjects were asked to stop the videotape at any time when they recalled processing a thought during the interaction between themselves and their pupils.

A minimum of six incidents from each videotape was discussed in each instance, using the following questions asked by the assistant:

"What was going on here?"

"What was your purpose while this was happening?"

"What were you thinking while you were in this situation?"

"Would you do anything different if that situation came up again?"

"If so, what? If not, why not?"

Responses were recorded in writing during these interviews by a recorder-assistant.

Data Analysis

Scores on the Ravens' Matrices were summarized for the group. Group means were determined for pre and post administrations. The results were then contrasted for significance of difference.

Responses in the stimulated-recall sessions were categorized according to conceptual level (See Appendix A) by contrasting the second-week results with the seventh-week results.

Two objective raters, graduate students in education, were trained to an .82 level of interrater reliability in categorizing responses to stimulated-recall questions according to the four Conceptual Levels identified by Grimmett (1984) (See Appendix A). All responses of student teachers were sorted by the raters individually into one of the four levels and all discrepancies in ratings (7%) were then resolved through interrater discussion.

Results

Table 1 presents a comparison of pre and post results on the Raven's Matrices, indicating a statistically significant change in the positive direction, using a t-test for difference between means for a correlated sample.

Table 1

Comparison of Pre and Post Means
on Raven's Standard Matrices
Hearing-Impaired Preservice Teachers

Pretest Mean Score	43.3	
		p .05
Post-test Mean Score	48.8	
	N=8	

Categorization of student teachers' first and second videotape responses according to Conceptual Level (I-IV) (see Appendix A) is shown in Table 2.

Table 2

Conceptual Level of Hearing-Impaired Student Teachers'
Responses to Stimulated Recall Questions

	Level IV (highest)	III	II	I	
First Videotaped Session	26%	26%	20%	28%	= 100%
Total Responses: 48					
Second Videotaped Session	28%	28%	22%	22%	= 100%
Total Responses: 48					

An example of a trainee's response which was categorized as "low" or at Conceptual Level I was:

Assistant: "Why did you ask each student to focus on only one child in the film? (High School Child Development course)?"

Student Teacher: "I did that because my Cooperating Teacher said it should be done that way."

An example of a trainee's response which was categorized as "high" or at Conceptual Level IV was:

Assistant: Why did you change the activity and let the children proceed on their own?" (Second grade class)

Student Teacher: "Because they had gotten the necessary information by that time; then I saw they were ready for the homework. Some students like to finish in class, and I can walk around the room to see how they are doing, since some students hesitate to ask when they don't understand."

Analysis of all responses revealed that during the viewing of the first videotape, 52% of responses were at Levels IV or III (high); half of these or 26% of the total responses were at Level IV (highest). A slight percentage increase was found in the higher conceptual levels by the second videotaping. This change, however, was not statistically significant.

A further analysis was carried out to learn if degree of hearing loss among the subjects was a factor in the conceptual level of their responses. No differences were found by comparing the response patterns of moderately, severely, and profoundly deaf subjects--an important finding in regard to breaking old stereotypes about degree of deafness in relation to cognitive performance.

Discussion

It is apparent that an improvement in abstract reasoning, as measured by the Raven's Matrices, had occurred between the beginning and end of the practicum period. However, without a comparison group of hearing subjects or a comparison group of deaf college students who were not involved in work with hearing children, it is not possible at this time to conclusively state that this practicum experience itself was the cause of the change.

The slight, though non-significant, trend toward higher conceptual level responses between the two stimulated-recall videotape sessions may be worthy of further investigation in a replicated study with a larger sample.

The finding of no conceptual-level trends favoring any of the three levels of hearing loss is important. This finding supports earlier research (Levine, 1976) that deaf persons have the normal range of intellectual potential, regardless of level of hearing loss.

It was therefore concluded that: (1) this student teaching experience with hearing children may be at least one factor in enhancing the reasoning skills of hearing-impaired pre-professionals; (2) the practicum period is too brief to bring about measurable change in conceptual level of responses to reflective questions about the practicum work; and (3) degree of hearing loss does not affect the conceptual functioning of hearing-impaired trainees' work with hearing children.

Recommendations

This study implies: (1) the need for wider experimentation with larger groups of subjects, both hearing and hearing-impaired; (2) hearing-impaired students entering this teacher education program have apparently strong potential for using reasoning skills in a preprofessional environment, thus validating the rather strict admissions criteria used in the program; and (3) degree of hearing loss must not be used as a discriminating criterion for determining which deaf persons have the potential to become teachers of hearing children.

Two other serendipitous results occurred from this pilot study. First, the videotape as a supervisory tool has proven to be highly useful; all

student teachers noted teaching behaviors in the first videotape which needed improvement and were able to change these behaviors very rapidly, resulting in better teaching. The videotape, therefore, is a valuable supplement to direct verbal feedback from the supervisor for hearing-impaired trainees. Prior research has already established its usefulness for hearing trainees.

Second, the quality of the student teaching recorded on both occasions for the eight subjects was so strong that a composite edited tape is being made. This composite will be used to: (1) demonstrate student teaching methods to future hearing-impaired students before they begin to work with hearing children, and (2) recruit new students into the teacher education program.

Future research on this highly important topic should now be expanded to include a larger sample as well as control groups for purposes of contrast. The similarities between the performance of hearing and hearing- impaired preservice teachers along this cognitive dimension of conceptual level establishes the importance of helping preservice teachers to become actively aware of their own teaching behavior from a cognitive point of view.

Ultimately, the reform of teacher education must take into account such findings. Only when teacher education develops a strong cognitive basis can we hope to have future teachers who will, as teachers, employ strong cognitive strategies in their choices of curriculum and instruction with their own students.

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APPENDIX A

Motivational Principles and Conceptual Level

Conceptual Level	Sensitization	Confirmation	Refutation	Neutralization	Bolstering	Behavioural Responses
LEVEL I	a) closedness to personal power b) openness to institutionally-derived power rules, and traditions	a) no ambiguity b) no role conflict c) clear prescription for behaviour	a) ambiguity b) role conflict c) unconventional behaviour	a) failure to perceive b) distortion and dissociation c) categorical judgments	a) reaffirming one's duty b) impersonalization c) increased valuation of criticized aspects	a) forming standards rapidly b) rigidity c) overgeneralized submission to authority
LEVEL II	a) openness to dimension of control and freedom from its imposition b) categorizes in terms of interpersonal threat	a) no evaluation b) successful opposition to authority	a) evaluative feedback b) interpersonal relationship not grounded in mutual opposition to authority	a) failure to perceive b) non-commitment c) denial of responsibility d) imputation of malevolence	a) reaffirming competence	a) source devaluation b) behavioural avoidance c) "boomerang" response
LEVEL III	a) sensitization to others b) differentiating between others	a) approval b) susceptibility to source-mediated evaluation	a) rejection b) experiences pressuring towards autonomy	a) denial of source responsibility b) denial of rejection	a) reaffirming social acceptance	a) self-evaluation excessive determined by others' evaluation b) overgeneralized submission to influence c) seeking interpersonal support
LEVEL IV	a) openness to differences between events b) openness to differing levels of task difficulty c) openness to variation in competence, or information potential, of sources	a) task analysis from many perspectives b) autonomy and interdependence	a) little experience of refutation b) restriction of autonomy and interdependence	a) assertion of difference between own and others' standard and denial that others' standard is relevant to self	a) reaffirming concern with information	a) maintaining standard in response to non-information social influence b) provisional self-devaluation and self-correction c) exploratory information-seeking behaviour

(Grimmett, 1984)